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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/675,922 | 09/29/2003 | Tomohiro Okumura | 3688ME-49 | 4135 |

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SHERIDAN ROSS PC
1560 BROADWAY
SUITE 1200
DENVER, CO 80202

EXAMINER

DHINGRA, RAKESH KUMAR

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| ART UNIT | PAPER NUMBER |
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1763

DATE MAILED: 03/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/675,922

Applicant(s)

OKUMURA ET AL.

Examiner

Rakesh K. Dhingra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Response to Arguments

1) Applicant's arguments with respect to claim 9, 10 have been considered but are moot in view of the new ground(s) of rejection as explained below.

Applicant has amended claim 9 for which new references Yuzurihara et al (US Patent No. 6,211,749), Collins et al (US Patent No. 5,065,118) and Ni et al (US PG PUB No. 2002/0139477) have been found which when combined with Mizuno et al read on the amended claim 9 limitations. Accordingly claim 9 has been rejected under 35 USC 103 (a) as being unpatentable over Mizuno et al in view of Yuzurihara et al, Collins et al and Ni et al as explained below.

Claim Objections

2) Listing of Claims shows Claims 1-8, that were earlier restricted "(Original)". These should be shown as "(Cancelled)".

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under

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37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mizuno et al (JP 09115851A) in view of Yuzurihara et al (US Patent No. 6,211,749), Collins et al (US Patent No. 5,065,118) and Ni et al (US PG PUB No. 2002/0139477).

Mizuno et al teach a plasma apparatus comprising:

a vacuum chamber 10;

a gas supplying apparatus 14 for supplying a gas into said vacuum chamber;

an evacuating apparatus 13 for evacuating said vacuum chamber;

a regulating of said vacuum chamber into a valve for controlling the pressure of said vacuum chamber into a predetermined value (the apparatus has pressure regulating means as per Paragraphs 0063, 0065, 0070);

a sample electrode 11 for placing a sample in said vacuum chamber;

a plasma generating apparatus 15;

a high frequency power supply 19 for supplying a high frequency electric power to sample electrode (Paragraphs 0059, 0065);

a high frequency power supply (2.45 GHz) for supplying a high frequency electric power to said plasma generating apparatus via a matching circuit for plasma generation apparatus (Paragraph 0064, not shown in the Drawing).

Mizuno et al do not teach a matching circuit comprising toroidal cores serving as two variable impedance elements which have no mechanically moving section and which

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are arranged in parallel while one of the variable impedance elements is earthed and the other of the variable impedance elements is connected to the plasma generating apparatus via a condenser with gradual impedance change accomplished by changing gradually at least one of the control parameters of gas species, gas flow rate, pressure, and high frequency electric power in 1 to 5 seconds while maintaining the generation of plasma.

Yuzurihara et al teach an apparatus (Figures 1, 3, 6A) that includes an impedance matching network for semiconductor manufacturing apparatus comprising of: toroidal cores 94, 95 serving as two variable impedance elements that have no mechanically moving section (Column 8, lines 30-50) and which are arranged in parallel (with respect to terminals T1, T2) and where change in inductance is accomplished due to change in control current that flows in control winding 2 (Figure 1) due to standing wave measurements of the reflected waves coming back from the load (plasma generator). Yuzurihara et al also teach that in this apparatus impedance change is accomplished faster (gradual) compared to conventional matching circuits.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use matching circuit with toroidal cores as taught by Yuzurihara et al in the apparatus of Mizuno et al to enable change impedance fast enough to match with the impedance change in the plasma chamber (Column 2, lines 20-40).

Mizuno et al in view of Yuzurihara et al do not teach matching circuit for the plasma generating apparatus having one of the variable impedance elements earthed and the other of the variable impedance elements connected to the plasma generating apparatus via a condenser, with gradual impedance change accomplished by changing

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gradually at least one of the control parameters of gas species, gas flow rate, pressure, and high frequency electric power in 1 to 5 seconds while maintaining the generation of plasma.

Collins et al teach a plasma apparatus (Figure 2) that includes a matching circuit which comprises inductance elements 10, 11 and 8, 9 (these include toroidal cores) and where inductance element 8, 9 is connected to plasma chamber 7 through a condenser 6 (Column 4, line 35 to Column 5, line 20). The other variable impedance element could be connected to ground depending upon circuit configuration like providing a return path.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a condenser between one element of impedance matching element and the plasma chamber as taught by Collins et al in the apparatus of Mizuno et al in view of Yuzurihara et al to enable isolate a dc voltage component on plasma electrode from the matching network (Column 4, lines 40-45).

Mizuno et al in view of Yuzurihara et al and Collins et al do not teach gradual impedance change accomplished by changing gradually at least one of the control parameters of gas species, gas flow rate, pressure and high frequency electric power in 1 to 5 seconds while maintaining the generation of plasma.

Ni et al teach a plasma processing apparatus (Figure 1) wherein circuit 12 that includes matching circuit 108 supplies power to plasma excitation coil 48 and a controller arrangement 16 includes microprocessor based program stored in memory for all process recipes and the controller controls all the sub-systems including gas flow/pressure and power circuit 12 etc on a closed loop basis. Ni et al also teach that

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amount of power supplied to plasma electrode (includes change of impedance) can be changed gradually as a function of time (would include 1-5 seconds) by means of a special program function that can be stored in the memory (Paragraphs 0026, 0029, 0033, 0035, 0043, 0044).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to gradual change of impedance as taught by Ni et al the process chamber as taught by Nishikawa et al in the apparatus of Mizuno et al in view of Yuzurihara et al and Collins et al to achieve gradual change in shape of material in the processed workpiece (Paragraph 0016).

Conclusion

Collins et al (US Patent No. 5,574,410) teach impedance matching circuits (Figures 3, 4) where shunt circuits comprise variable inductances in parallel with fixed capacitance for configurations where load impedance is referred to ground or the same is floating, and where one end of both inductor and capacitor can be connected to ground (Column 4, line 30 to Column 5, line 30).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Rakesh Dhingra


Parviz Hassanzadeh
Supervisory Patent Examiner
Art Unit 1763